What is Claimed is:

1. A method for producing a high density CNT film or pattern having a carboxyl group, exposed on its surface, which comprises the steps of:

(a) reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a patterned substrate with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of substrate by amidation reaction between the amine group and the carboxyl group;

(b) reacting the CNT single layer or single layer pattern with a diamine type organic compounds to modify the CNT single layer with an organic amine group and reacting the organic amine with the CNT having exposed carboxyl groups to laminate a CNT layer thereon; and

(c) repeating the step (b) n times to form CNT layers and organic amine groups laminated alternately for n times, thereby forming a high density CNT film or pattern having exposed carboxyl groups.

2. The method according to claim 1, wherein the substrate is selected from the group consisting of silicon, glass, melted silica, plastics and PDMS.

3. The method according to claim 1, wherein the substrate having the amino functional groups exposed on its surface is prepared by treating the substrate with aminoalkyloxysilane.

4. The method according to claim 1, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on the substrate having the exposed amine groups.

5. The method according to claim 1, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on a substrate, followed by treatment with aminoalkyloxysilane.

6. The method according to claim 1, wherein the chemical functional group capable of binding to carboxyl group is amine group or hydroxyl group.

7. A high density CNT film or pattern which is prepared by the method according to claim 1, and has a carboxyl group exposed on its surface.

8. A method for fabricating a CNT-biochip comprising bio-receptors fixed to the carboxyl group exposed on the CNT film or pattern according to claim 7 by chemical or physicochemical bond, in which the bio-receptors have a functional group capable of binding to the carboxyl group.

9. The method according to claim 8, wherein the chemical functional group capable of binding to carboxyl group is amine group or hydroxyl group.

10. A CNT-biochip which is prepared by the method according to claim 8, and comprising bio-receptors fixed to the carboxyl group exposed on the CNT film or

pattern by chemical or physicochemical bond, in which the bio-receptors have a functional group capable of binding to the carboxyl group.

11. The CNT-biochip according to claim 10, wherein the bio-receptor is selected from the group consisting of a enzyme substrate, a ligand, an amino acid, a peptide, protein, DNA, RNA, PNA, lipid, a cofactor and a carbohydrate.

12. The CNT-biochip according to claim 11, wherein the bio-receptor is DNA.

13. A method for detecting a target biomaterial capable of binding to or interacting with a bio-receptor, wherein the method is characterized by using the CNT-biochip according to claim 10.

14. A method for detecting DNA hybridization, wherein the method is characterized by using the CNT-DNA chip according to claim 12.

15. A method for producing a high density CNT film or pattern having a chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen, exposed on its surface, which comprises the steps of:

(a) reacting a substrate having amine groups exposed on the surface or a substrate having amine groups exposed in a pattern with CNT having exposed carboxyl groups to form a CNT single layer or single layer pattern on the surface of substrate by amidation reaction between the amine group and the carboxyl group;

(b) reacting the CNT single layer or single layer pattern with a diamine type organic compound to form an organic amine layer on the CNT single layer and reacting the organic amine with the CNT having exposed carboxyl groups to laminate a CNT layer thereon;

(c) repeating the step (b) n times to form CNT layers and organic amine layers laminated alternately for n times, thereby forming a high density CNT film or pattern having exposed carboxyl groups; and

(d) modifying the high density CNT film or pattern having exposed carboxyl groups with a chemical compound having both a functional group capable of binding to the carboxyl group and a chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen.

16. The method according to claim 15, wherein the substrate is selected from the group consisting of silicon, glass, melted silica, plastics and PDMS.

17. The method according to claim 15, wherein the substrate having the amino functional groups exposed on its surface is prepared by treating the substrate with aminoalkyloxysilane.

18. The method according to claim 15, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on the substrate having the exposed amine groups.

19. The method according to claim 15, wherein the substrate having the amine groups exposed in a pattern is prepared by forming a photoresist or organic supra-molecule pattern on a substrate, followed by treatment with aminoalkyloxysilane.

20. The method according to claim 15, wherein the chemical functional group capable of binding to carboxyl group is amine group or hydroxyl group.

21. The method according to claim 15, wherein the chemicals having both the functional group capable of binding to carboxyl group and the chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen include H_2N-R_1-NH_2, H_2N-R_2-CHO, H_2N-R_3-OH, H_2N-R_4-SH, or H_2N-R_5-X in which R_1, R_2, R_3, R_4 and R_5 are independently a C_{1-20} saturated hydrocarbon, un-saturated hydrocarbon or aromatic organic group and X is halogen element.

22. A high density CNT film or pattern which is prepared by the method according to claim 15, and has a chemical functional group exposed on its surface, in which the chemical functional group is selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen.

23. A method for fabricating a CNT-biochip comprising bio-receptors fixed to the chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen, exposed on the CNT film or pattern according to claim 22 and by chemical or physicochemical bond, in which the bio-receptors have a functional group capable of binding to the chemical functional group.

24. The method according to claim 23, wherein the chemicals having both the functional group capable of binding to carboxyl group and the chemical functional group selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen include H_2N-R_1-NH_2, H_2N-R_2-CHO, H_2N-R_3-OH, H_2N-R_4-SH, or H_2N-R_5-X in which R_1, R_2, R_3, R_4 and R_5 are independently a C_{1-20} saturated hydrocarbon, un-saturated hydrocarbon or aromatic organic group and X is halogen element.

25. A CNT-biochip which is prepared by the method according to claim 23, and comprising bio-receptors fixed to the chemical functional group exposed on the CNT film or pattern and selected from the group consisting of amine group, aldehyde group, hydroxyl group, thiol group and halogen by chemical or physicochemical bond, in which the bio-receptors have a functional group capable of binding to the chemical functional group.

26. The CNT-biochip according to claim 25, wherein the bio-receptor is selected from the group consisting of a enzyme substrate, a ligand, an amino acid, a peptide, protein, DNA, RNA, PNA, lipid, a cofactor and a carbohydrate.

27. The CNT-biochip according to claim 26, wherein the bio-receptor is DNA.

28. A method for detecting a target biomaterial capable of binding to or interacting with a bio-receptor, wherein the method is characterized by using the CNT-biochip according to claim 25.

29. A method for detecting DNA hybridization, wherein the method is characterized by using the CNT-DNA chip according to claim 27.

30. A multilayer CNT structure, comprising a substrate and multiple CNT layers on the substrate, wherein said multiple CNT layers include (i) CNTs bonded to the substrate via peptide linkages (-NHC(O)-), (ii) CNTs bonded to other CNTs via linkers including CNT-connecting peptide linkages (-NHC(O)-) and (iii) CNTs having pendant carboxyl functionality.

31. A multilayer CNT structure according to claim 30, further including a bio-receptor coupled thereto.